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Mr. Charles Lewis
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

August 22, 1985

Reference: EPA Contract No. 68-01-7038; Work Assignment R05-02-11; Ford Allen Park Clay Mine Landfill

Dear Mr. Lewis:

Enclosed please find the final deliverables for the above-referenced work assignment, consisting of technical comments, technical review checklist and technical exhibits.

Please call me if you have any questions.

Sincerely,

Kay H. Breeden

Kay H. Breeden
Technical Director

cc: D. Beasley
G. Bennsky
J. Butler
J. Grieve
J. Blasco, HLA
R. Volkmar, MBE

TECHNICAL COMMENTS
FORD (ALLEN PARK CLAY MINE)
MID 980 56 8711

C-1 Chemical and Physical Analyses: 270.14(b)(2), 264.13(a)

The chemical analysis for waste F006 (wastewater treatment sludge from electroplating operations) provides a typical range of hydroxide sludge constituents from a composite of similar generators, but does not indicate if these are analyses of total constituents in the wastes or analyses of the extracts, using the EP toxicity test. Clarify which analyses these results represent. Provide the mean values of the ranges cited.

The application indicates that F006 wastes will be analyzed before acceptance at the site, and that waste analyses will not be available before July 1, 1984 (Section C, page 75). The waste analysis plan for this waste (Attachment 10, page 95A) describes the "fingerprinting" parameters to be used in screening individual waste shipments, but does not provide the test methods to be used in developing the waste analysis. Describe the specific test methods to be used in performing this analysis. If the analysis has been performed, provide the results.

C-1d Landfilled Wastes: 264.314(c)

Provide the results from the Paint Filter Liquids Test (Method 9095 in "Test Methods for Evaluating Solid Wastes, Physical, Chemical Methods", EPA Publication No. SW-846), showing that containerized or bulk wastes do not contain free liquids.

C-2 Waste Analysis Plan: 270.14(b)(3), 264.13(b) and (c)

C-2a Parameters and Rationale: 264.13(b)(1)

Demonstrate that screening procedures will include a determination that containers are at least 90 percent full (264.315(a)).

For waste K061, the proposed analytical parameters for the the EP toxicity test are chromium, cadmium, and lead, which were the constituents upon which the RCRA listing were based. However, based on the waste analysis provided in

Attachment 9, page 81, the waste includes selenium in concentrations indicating EP toxicity for selenium. Therefore, the EP toxicity test should also include selenium, or a demonstration should be provided showing that the EP toxicity test for selenium is not needed.

C-2b Test Methods: 264.13(b)(2)

Provide a description of the quality assurance/quality control program to be used in applying the proposed test methods.

C-2c Sampling Methods: 264.13(b)(3), Part 261, Appendix I

Provide the sampling procedures to be used, and demonstrate that the samples provided by these procedures are representative of the entire waste column.

Provide a description of the quality assurance/quality control program to be used in applying the proposed sampling methods.

Describe chain-of-custody procedures for handling samples, and procedures for preservation of samples.

C-2e Additional Requirements for Wastes Generated Off-Site: 264.13(c)

The waste analysis plan indicates that certain "fingerprinting" parameters will be analyzed for each load, but does not provide a description of the sampling process. Provide the number of drums proposed to be sampled per load and the basis for this sample size.

D-6c Liner System, General Items

D-6c(1) Liner System Description: 270.21(b)(1), 264.301(a) and (c)

The description of the liner system provided does not provide adequate detail. The description must document that any flow through the liners will be prevented. ALso, see Comment D-6d(1), D-6e(1), D-6e(2), and D-6f(1).

D-6c(3) Loads on Liner Systems: 270.21(b)(1), 264.301(a)(1)(i)

In addition to the loads on the liner system discussed in the text, provide the results of calculations that define the following:

- Stresses on the liner system due to climatic conditions (such as freeze-thaw)

- Loads imposed during installation of liner system and operation of landfill (i.e., loads imposed by waste compaction equipment). These loads are especially critical on the side slopes of the landfill excavation, as these areas will not have the leachate collection/detection drainage layers to protect the liner.

The assumed unit weight of the waste materials used to calculate loads (75 pcf) appears to be a low estimate. Provide documentation for the assumed value (e.g., published literature or field measurements) or modify calculations to account for a more conservative value.

D-6c(4) Liner System Coverage: 270.21(b)(1), 264.301(a)(1)(iii)

The "overlap and bonding detail" presented on Sheet 11 indicates that the primary liner will not be physically bonded together with the liner in adjacent cells. Construction of the liner in this manner does not result in a continuous primary liner beneath the site. Modify the design to show that the liners from adjacent cells will be physically seamed, forming a continuous liner.

D-6c(5) Liner System Exposure: 270.21(b)(1), 264.301(a)(1)(i)

Although the HDPE liner will be covered by a geotextile fabric, provide a description of how the liner will be protected from damage due to winds prior to placement of wastes against the upper side slopes.

D-6d Liner System Foundation

D-6d(1) Foundation Description: 270.21(b)(1), 264.301(a)(1)(i)

Provide a more detailed description of the procedures that will be used to dewater the cell bottom and prepare the liner foundation subgrade prior to construction of the secondary liner.

D-6d(3) Laboratory Testing Data: 270.21(b)(1), 264.301(a)(1)(ii)

The applicant must provide a detailed description of the test procedures used to determine the permeability of the site's

soils. The application states on page 17 of Exhibit H that applicable ASTM standards were used; however, the only ASTM procedure for permeability testing is ASTM D2434 which is unsuitable for testing fine grain soils. List all appropriate procedures used.

D-6d(4) Engineering Analysis: 270.21(b)(1), 264.301(a)(1)(ii)

Provide additional information that indicates subsidence due to the presence of the salt mines beneath the site will not be a problem.

D-6d(4)(a) Settlement Potential: 270.21(b)(1), 264.301(a)(1)(ii)

The settlement calculations provided use a total compressible layer thickness of 52 feet including the secondary clay liner. However, the log of Boring TB-1 indicates that this same layer would be up to 67 feet thick. Revise the analyses to account for this difference.

The settlement analysis also assumes a unit weight of 75 pcf for the waste material. This appears to be a low estimate for this type of material. Provide documentation for the assumed value (e.g., published data) or adjust the calculations to account for a more conservative value for the unit weight of the waste.

Based on the varying subsurface conditions and concentrated loads due to berms and sumps, provide estimates of potential differential settlement.

D-6d(4)(b) Bearing Capacity: 270.21(b)(1), 264.301(a)(1)(ii)

The bearing capacity analysis used a shear strength of 900 psf; however, test results presented indicate that the shear strength of these materials is 600 psf. Revise the calculations accordingly.

D-6d(4)(c) Stability of Landfill Slopes: 270.21(b)(1), 264.301(a)(1)(ii)

The stability analyses cannot be technically evaluated until the following information is provided:

- Legible copies of the cross section of the excavation slopes that have been analyzed. The copies included in the application are poorly reproduced and at a scale that

does not permit review of details. For each cross section analyzed, the resulting factor of safety should be clearly labeled.

- Provide a plan view of the landfill indicating the location of all slopes analyzed.

- Provide computer program referenced, including program name, author, and latest revision date.

- Provide a copy of all the computer output that is generated as part of the analyses.

A stability analysis should be performed for the excavation slopes on the eastern side of Cell II. This slope in its upper reaches will be supported by a portion of the completed Cell I landfill. Also, a stability analysis should be performed for the landfill slopes during construction (see Section A-A, Phase II, Sheet 8), as failure of these slopes would significantly impair the integrity of the liner system. Since the landfill wastes will have substantially lower strengths, the stability of these areas is critical. Documentation of the strength parameters of the waste material used in the analysis must be provided.

D-6e Liner Systems, Liners

D-6e(1) Synthetic Liners: 270.21(b)(1), 264.301(a)(1), 264.301(c)

Provide the brand name and manufacturer of the synthetic liner to be used. Detailed synthetic liner specifications must also be provided as per Item D-6g(1)(a).

D-6e(1)(a) Synthetic Liner Compatibility Data: 270.21(b)(1), 264.301(a)(1)(i)

The liner/waste compatibility test data are inadequate. The following information must be provided:

- A detailed description of the testing procedures used or, if appropriate, reference a standard test method.

- A description of how the waste leachate samples were prepared or obtained and a demonstration that they are representative of what the liner will be exposed to in the landfill.

- A description of the synthetic liner tested including thickness, brand name, and manufacturer.

- A discussion and analysis of the test results that demonstrates the liner strength and performance are still adequate after exposure to waste leachates and waste.

D-6e(1)(b) Synthetic Liner Strength: 270.21(b)(1), 264.301(a)(1)(i)

Provide data showing that the synthetic liners have sufficient strength after exposure to the waste and waste leachate to support the loads/stresses as computed in Item D-6c(3). Also demonstrate that the liner seams will have sufficient strength. Demonstrate that the synthetic liner has sufficient strength to handle the expected foundation settlement.

D-6e(1)(c) Synthetic Liner Bedding: 270.21(b)(1), 264.301(a)(1)(ii)

Demonstrate that the geotextile fabric that will be placed over the synthetic liner on the side slopes has sufficient properties to prevent rupture of the synthetic liner during installation and operation. Also, the gradation data for the proposed sand indicates that material up to 1 inch in size may be present. Demonstrate that material of this size will not damage the synthetic liner.

D-6e(2) Soil Liners: 270.21(b)(1), 264.301(a) and (c)

Indicate the borrow source for clay liner material. If the in-place soil will be used, indicate how this material will be selected and stockpiled for later use. Demonstrate the remolded low permeability material that will be used for the soil liner has a permeability of 1×10^{-7} cm/sec or less.

D-6e(2)(a) Material Testing Data: 270.21(b)(1), 264.301(c)

Although the application provides sufficient information concerning the in situ properties of the underlying clay soils, little information is available concerning the remolded clay properties. Therefore, the following must be provided:

- Results of compaction testing indicating maximum dry density and optimum moisture content.

- Results of permeability, strength, and consolidation tests performed on remolded samples. These samples should be compacted to the same percent compaction as is proposed for the liner and must be representative of the material that will be used for the soil liner.

Provide copies of the test procedures or, if appropriate, reference standard test methods, along with complete test results. Discuss the potential for dissolution and piping of the soil due to flow of liquid through the soil liner.

D-6e(2)(b) Soil Liner Compatibility Data: 270.21(b)(1), 264.301(a)(1)(i)

Provide the results of permeability testing of the soil liner material which uses leachate representative of the leachate that the landfill could generate.

The following information must be included:

- A description of the test procedures, or reference to a standard test method

- A description of how the leachate samples were prepared, including a demonstration that the samples are representative of actual landfill conditions

- Complete test results, including a discussion of the effects of the leachate on soil permeability

D-6e(2)(c) Soil Liner Thickness: 270.21(b)(1), 264.301(c)

Until the permeability test results requested in Comment D-6e(2)(a) are provided, this item cannot be deemed adequate.

D-6e(2)(d) Soil Liner Strength: 270.21(b)(1), 264.301(a)(1)(i)

Demonstrate that the soil liner has sufficient strength to support the loads/stresses computed in Item D-6c(3).

D-6f Liner System, Leachate Collection/Detection Systems

D-6f(1) Systems Operation and Design: 270.21(b)(1), 264.301(a)(2)

Provide a detailed description of the drainage fabric that will be used on the upper side slopes of the leachate collection and detection systems. Demonstrate that this material will be capable of transmitting leachate to the collection and detection systems in a timely manner.

The discussion or attached calculations provided in the application do not document the leachate detection system is capable of detecting leachate through the liner in a timely manner. Calculations must document the capacity of the system and the estimated time for leakage to travel to the detection sump. Address this deficiency.

D-6f(2) Equivalent Capacity: 270.21(b)(1), 264.301(a)(2)

Since the leachate collection/detection systems propose to use synthetic drainage material on the upper side slopes to replace the granular drainage material, demonstrate that the proposed system has a drainage capacity, both in speed and volume, that is equal to or better than a 12-inch granular drainage layer with a permeability of 1×10^{-2} cm/sec.

Based on the application, it is unclear if the applicant intends to use filter fabric or drainage net for the leachate collection/detection systems that go up the side walls. Clarify this matter and provide the requested equivalent demonstration for the proposed system.

D-6f(3) Grading and Drainage: 270.21(b)(1), 264.301(a)(2)

Sheet 6 of the design drawings presents the grading plan and pipe layout for the leachate collection/detection systems. However, these sheets also provide numerous other details that inhibit the evaluation of the proposed design. Submit a plan that depicts only the grading plan and pipe layout plan for the leachate collection/detection systems.

The water balance used to determine the leachate impingement rate on the leachate collection system is inadequate. Review of the reference noted for the evaporation rate used does not coincide with the applicant's conclusion. The following issues must be addressed:

- The evaporation rates used must be fully documented. If published data is used, the source of the data must be provided.

- The surface-water runoff coefficient appears to be high for "relatively flat" slopes, as indicated on page 121A. Provide documentation for values used.

- Provide a description of intermediate cover and its slope.

- Snow accumulation must be addressed as part of the water balance.

- Provide the source of rainfall data used in analysis. If the rainfall data is based on the average annual precipitation, discuss what the effects of above-average rainfalls will have on the design.

The calculations provided concerning leachate collection pipe capacity must be revised based on the results of the revised water balance.

The perforated leachate collection pipes are not continuous along the low point of each subcell (Sheet 6). Provide an explanation of how the system will provide adequate collection of all leachate.

Also provide a demonstration that the layout of the leachate monitoring pipes will allow rapid detection of leakage. The pipes, as shown on Sheet 6, are designed in the direction of greatest slope and, as such, will only detect leakage within close proximity to the pipe itself.

Demonstrate that the leachate collection/detection systems will function properly after the anticipated settlements have occurred.

The leachate detection system must be equipped with a system to measure the quantity of leakage collected. Provide a description of the procedures and equipment used to measure leakage into the detection system.

Describe the ultimate fate of the collected leachate after placement into the storage tank. Demonstrate that it will be disposed of properly.

Describe the type of analyses to be performed on the liquids collected in the detection system and the method of disposal of this material.

D-6f(4) Maximum Leachate Head: 270.21(b)(1), 264.301(a)(2)

The equation used by the applicant to determine the maximum head over the synthetic liner does not agree with the guidance provided in the EPA publication SW-869 (April 1983). A check calculation using the referenced guidance, the applicant's data, and an assumed value of 0.4 for the porosity of the drainage layer results in a maximum leachate head of 1.3 feet (see Exhibit D-6f(4). Provide an explanation for the difference in results. Note that the equation used by the applicant was presented in the earlier edition of SW-869; however, it was removed when the publication was revised in 1983.

Also, as mentioned in Comment D-6f(3), the water balance used to determine the impingement rates is inadequate. Revise the analysis of the maximum leachate head to include the new value for the impingement rate.

D-6f(5) Systems Compatibility: 270.21(b)(1), 264.301(a)(2)(i)(A)

On page 132A of the application, it states that the pipe selection was subject to compatibility testing, but no test results are presented. Demonstrate that all components of the leachate collection/detection systems are chemically resistent to the waste managed in the landfill and the leachate expected to be generated.

D-6f(6) Systems Strength

D-6f(6)(a) Stability of Drainage Layers: 270.21(b)(1), 264.301(a)(2)(i)(B)

Demonstrate that the drainage layers of the leachate collection/detection systems have sufficient strength and thickness to support the loads computed in Item D-6c(3). Demonstrate that the drainage layers placed on side slopes of the landfill or foundation will be stable during construction.

D-6f(6)(b) Strength of Piping: 270.21(b)(1), 264.301(a)(2)(i)(B)

The pipe deflection analysis does not consider the effects of the pipe perforations on the pipes ability to withstand the stated loads. The analysis must be redone using the method described in EPA publication SW-870.

Also, the analysis does not address the expected loading due to construction equipment during installation. During placement of the leachate collection/detection drainage layer, the piping will have the least amount of cover (less than 1 foot of sand) and be subject to damage. Provide documentation that the pipes can withstand anticipated construction loads.

D-6f(7) Prevention of Clogging: 270.21(b)(1), 264.301(a)(2)(ii)

The application does not address chemical clogging of the leachate collection/detection systems. Provide a description of how clogging would be detected and what cleanout procedures would be used to restore capacity of the systems.

D-6g Liner System, Construction, and Maintenance

D-6g(1) Material Specifications

D-6g(1)(a) Synthetic Liners: 270.21(b)(1), 264.301(a)(1)

Provide detailed material specifications for the specific synthetic liner to be used.

D-6g(1)(b) Soil Liner: 270.21(b)(1), 264.301(a)(1)

The soil liner specifications must be revised to include the following:

- Maximum particle size
- Procedures for obtaining undisturbed samples of the in-place clay liner
- Provide procedures for in-place permeability tests of the clay liner.
- Criteria that will be used to approve completed portions of the clay liner prior to placement of additional components of the liner system.

The specifications allow the moisture content of the liner material to vary from 2 percent dry to 5 percent wet of the optimum moisture content. Based on the two compaction curves presented in Exhibit H of Attachment 15, it is not possible to obtain the required compacted moisture contents at 5 percent wet of optimum. Revise the specifications accordingly.

D-6g(1)(c) Leachate Collection/Detection Systems: 270.21(b)(1), 264.301(a) and (c)

The specifications provided for geotextile drainage fabric and filters do not provide sufficient detail. Provide detailed specifications for these materials and any other materials to be used in the collection/detection systems indicating minimum strength requirements, thickness, material type, etc. Provide specific manufacturer and brand name, if available. Provide specifications for the pre-cast concrete sumps.

D-6g(2) Construction Specifications

D-6g(2)(a) Liner System Foundation: 270.21(b)(1), 264.301(a)(1), 264.303(a)

Provide construction specifications for preparation of the liner system foundation.

D-6g(2)(b) Soil Liner: 270.21(b)(1), 264.301(a)(1), 264.303(a)(2)

The construction specifications for the soil liner do not provide sufficient detail. Modify the specifications to include a detailed description of:

- Moisture conditioning methods
- Provisions for scarifying between lifts
- Provisions for preparing the liner surface prior to installation of the leachate detection system. Also, provide a detailed description of the construction techniques that will be used to build the clay liner against the excavation side walls. Include procedures for preparing the side wall foundation materials.

D-6g(2)(c) Synthetic Liners: 270.21(b)(1), 264.301(a)(1), 264.303(a)(1)

Provide construction specifications for placement of the synthetic liners which include:

- inspection of the synthetic liner bed for material which could puncture the liner (and removeal of that material);
- placement procedures;
- techniques to be utilized to bond the liner seams; and
- procedures for protection of the liner before and during placement of material on top of the liner.

D-6g(2)(d) Leachate Collection/Detection Systems: 270.21(b)(1), 264.301(a) and (c)

Provide construction specifications for placement of all components of the leachate collection/detection systems, including:

- drainage layers;
- piping;
- sumps, pumps, etc.;
- filter layers; and
- any protective layer placed to protect the system during construction or operations.

D-6g(3) Construction Quality Control Program: 270.21(b)(1), 270.30(k)(2), 264.303(a)

The construction quality control program has the following deficiencies:

- Frequency of testing of the soil liner is not adequate. The proposed frequency is equivalent to one test per 27,000 square feet of clay liner installed (1 foot thick). The same comment applies to the frequency of moisture content testing.

- Frequency of in situ permeability testing is inadequate and does not include in-place permeability testing. The proposed frequency would result in one test for every 135,000 square feet of completed liner (5 feet thick).

Address these deficiencies.

The program presented in the application generally does not provide the appropriate level of detail. For guidance on this matter, the applicant is referred to the "Draft Guidance on Implementation of the Minimum Technological Requirements of the Hazardous and Solid Waste Commandments of 1984," May 24, 1985, EPA/530-SW-85-014.

D-6g(4) Maintenance Procedures for Leachate Collection/Detection Systems: 270.21(b)(1), 264.301(a) and (c)

Describe the anticipated maintenance activities that will be used to assure proper operation of the leachate collection/detection systems throughout the landfill's expected life.

D-6g(5) Liner Repairs During Operations: 270.21(b)(1), 264.301(a)

Describe the methods that will be used to repair any damage to the liner which occurs while the landfill is in operation during placement of the waste (such as a dozer ripping the liner).

		Technically Adequate (Y/N)	See Attached Comment	See Attached Exhibit	Location of Information
C. WASTE CHARACTERISTICS					
C-1	Chemical and physical analyses, including sampling/analysis methods	N	X	X	Sec. B, pp. 32-60; Sec. C, pp. 73-90
C-1a	Containerized wastes	N/A			
C-1b	Waste in tanks	N/A			
C-1c	Waste in piles	N/A			
C-1d	Landfilled wastes	N	X		Not provided in application
C-1e	Wastes incinerated and wastes used in performance tests	N/A			
C-1f	Wastes to be land treated	N/A			
C-2	Waste analysis plan				
C-2a	Parameters and rationale	N	X	X	Attachment 10, pp. 93A-98A
C-2b	Test methods	N	X	X	Attachment 10, pp. 93A-98A
C-2c	Sampling methods	N	X	X	Attachment 10, pp. 93A-98A
C-2d	Frequency of analyses	Y			Attachment 10, pp. 93A-98A
C-2e	Additional requirements for wastes generated off-site	N	X	X	Attachment 10, pp. 93A-98A
C-2f	Additional requirements for ignitable, reactive or incompatible wastes	N/A			

		Technically Adequate (Y/N)	See Attached Comment	See Attached Exhibit	Location of Information
D-6	Landfills				
D-6a	List of wastes				
D-6b	Liner system exemption requests				
D-6b(1)	Exemption based on existing portion				
D-6b(2)	Exemption based on alternative design and location				
D-6b(3)	Exemption for monofills				
D-6b(4)	Groundwater monitoring exemption				
D-6b(4)(a)	Engineered structure				
D-6b(4)(b)	No liquid waste				
D-6b(4)(c)	Exclusion of liquids				
D-6b(4)(d)	Containment system				
D-6b(4)(e)	Leak detection system				
D-6b(4)(f)	Operation of leak detection system				
D-6b(4)(g)	No migration				
D-6c	Liner system, general items				pp. 104A - 109A
D-6c(1)	Liner system description	N	X		p. 104A
D-6c(2)	Liner system location relative to high water table	Y			Attachment 15, Exhibit H, p. 31
D-6c(3)	Loads on liner system	N	X	X	pp. 104.1A - 104.4A, 106.9A - 109A
D-6c(4)	Liner system coverage	N	X		Attachment 14, Sheets 6, 7 and 11
D-6c(5)	Liner system exposure prevention	N	X		p. 104.4A

		Technically Adequate (Y/N)	See Attached Comment	See Attached Exhibit	Location of Information
D-6d	Liner system, foundation				
D-6d(1)	Foundation description	N	X		pp. 104.5A-104.7A, Attachment 15, Exhibit H
D-6d(2)	Subsurface exploration data	Y		X	pp. 104.5A-104.7A, Attachment 15, Exhibit H
D-6d(3)	Laboratory testing data	N	X	X	pp. 104.5A-104.7A, Attachment 15, Exhibit H
D-6d(4)	Engineering analysis				
D-6d(4)(a)	Settlement potential	N	X	X	pp. 108.3A-108.7A
D-6d(4)(b)	Bearing capacity	N	X	X	p. 108.9A
D-6d(4)(c)	Stability of landfill slopes	N	X	D-6d(4)(b)	pp. 107.2A-107.7A
D-6d(4)(d)	Potential for excess hydrostatic or gas pressure	Y		X	pp. 107.8A-108.2A
D-6e	Liner system, liners				
D-6e(1)	Synthetic liners	N	X		p. 104.1A
D-6e(1)(a)	Synthetic liner compatibility data	N	X	X	Ford Motor Company Report
D-6e(1)(b)	Synthetic liner strength	N	X	X	Not provided
D-6e(1)(c)	Synthetic liner bedding	N	X		p. 104.3A
D-6e(2)	Soil liners	N	X		p. 104.4A-104.5A
D-6e(2)(a)	Material testing data	N	X		p. 104.4A-104.7A
D-6e(2)(b)	Soil liner compatibility data	N	X		Not provided
D-6e(2)(c)	Soil liner thickness	N	X		pp. 104.4A, p. 169
D-6e(2)(d)	Soil liner strength	N	X		
D-6f	Liner system, leachate collection/detection systems				pp. 104.1A-104.4A, 110-113, 118A-125A
D-6f(1)	System operation and design	N	X	X	pp. 104.1A-104.4A, 110-113, 118A-125A
D-6f(2)	Equivalent capacity	N	X		Not provided

		Technically Adequate (Y/N)	See Attached Comment	See Attached Exhibit	Location of Information
D-6f(3)	Grading and drainage	N	X		pp. 104.1A-104.4A, 110-113, 118A-125A
D-6f(4)	Maximum leachate head	N	X	X	pp. 122A-123A
D-6f(5)	System compatibility	N	X	X	p. 132A
D-6f(6)	System strength				
D-6f(6)(a)	Stability of drainage layers	N	X		Not provided
D-6f(6)(b)	Strength of piping	N	X	X	pp. 130A-133A
D-6f(7)	Prevention of clogging	N	X	X	pp. 124A-128A
D-6g	Liner system, construction and maintenance				
D-6g(1)	Material specifications				
D-6g(1)(a)	Synthetic liners	N	X		p. 104.1A
D-6g(1)(b)	Soil liners	N	X		pp. 111A-112A
D-6g(1)(c)	Leachate collection/detection systems	N	X		p. 120A
D-6g(2)	Construction specifications				
D-6g(2)(a)	Liner system foundation	N	X		pp. 111A-112A
D-6g(2)(b)	Soil liner	N	X		pp. 111A-112A
D-6g(2)(c)	Synthetic liners	N	X		pp. 112A-118A
D-6g(2)(d)	Leachate collection/detection systems	N	X		pp. 118A-120A
D-6g(3)	Construction quality control program	N	X		pp. 110A-120A
D-6g(4)	Maintenance procedures for leachate collection/detection system	N	X		Not provided
D-6g(5)	Liner repairs during operations	N	X		Not provided

Exhibit C-1

C-1: PHYSICAL AND CHEMICAL DESCRIPTION OF WASTES

I. FACTORS CONSIDERED

- X Wastes to be handled, RCRA number and basis for hazard designation
- _ Hazardous constituents listed in Appendix VII to 40 CFR Part 261
- _ Treatment, storage and disposal units (or processes) to be permitted, as well as specific process requirements and tolerance limits
- X Physical descriptions of wastes
- X Chemical descriptions of wastes
- X Sources of wastes (i.e., how generated)
- X Physical state of wastes
- X Ignitability, reactivity and/or incompatibility
- X Source of data (e.g., lab reports, documented data from a similar process) (lab reports and documented data from similar processes)
- _ Appendix VIII constituents, where applicable
- _ _____
- _ _____

II. BASIS OF TECHNICAL DECISION

- X Data provided by applicant (e.g., laboratory analytical results, material safety data sheets).
- _ Published literature or other materials (cite below or attach a listing).

C-2a: WASTE ANALYSIS PLAN - PARAMETERS AND RATIONALE

I. FACTORS CONSIDERED

X Parameters to be analyzed for

X Wastes to be managed and their hazard characteristics

X Hazardous waste TSD processes and appropriateness of parameters to be analyzed for to those processes

X Process tolerance limits (Note: No corrosive, ignitable, or reactive wastes)

X Waste characterization data provided in Part B application

X Reactive or ignitable wastes

X Potential waste incompatibilities

X Physical states of wastes

X Rationale for parameters selected

X Sources of wastes and variability of waste composition

_ ____

_ ____

II. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

o location in application: Attachment 10, pp. 93A-98A

_ Published literature or other materials (cite below or attach a listing).

C-2b: WASTE ANALYSIS PLAN - TEST METHODS

I. FACTORS CONSIDERED

X Test parameters

X Physical state of samples

X Wastes and their constituents

_ Possible interferences

X Acceptability of test methods

_ Accuracy and limits of detection

X QA/QC program (not provided)

_ _____

_ _____

II. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

o location in application Attachment 10, pp. 93A-98A

_____

_ Published literature or other materials (cite below or attach a listing).

C-2c: WASTE ANALYSIS PLAN - SAMPLING METHODS

I. FACTORS CONSIDERED

X Physical state (i.e., solid, liquid, gas) of wastes

X Potential for layered wastes

X Sampling devices and procedures

_ Locations of sampling

X Randomness or representativeness of samples (not provided)

X Composite vs. grab samples

_ Sample containers

_ Method of identifying samples

X Chain of custody procedures (not provided)

X Preservation of samples (not provided)

X QA/QC program (not provided)

_ _____

_ _____

II. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

o location in application: Attachment 10, pp. 93A-98A

_____

_ Published literature or other materials (cite below or attach a listing).

Exhibit C-2e

C-2e: WASTE ANALYSIS PLAN - ADDITIONAL REQUIREMENTS FOR WASTES GENERATED OFF-SITE

I. FACTORS CONSIDERED

- X Nature of the wastes to be received from off-site
- X Volume of shipments and variability of waste composition
- _ Pre-acceptance testing
- X Physical state of wastes
- X Potential for layering of waste
- X Physical inspection and fingerprint analysis of incoming waste loads
- X Sampling devices and procedures for fingerprinting of incoming waste loads
- X Fingerprint analysis methods
- _ Reanalysis procedures when test results are inconsistent with previous data
- X Criteria for waste acceptance/rejection
- X Procedure for returning or rerouting rejected waste loads
- X Statistical basis for number of samples (not provided)
- _ QA/QC program
- _ _____
- _ _____

II. BASIS OF TECHNICAL DECISION

- X Verification of applicant supplied data
  - o location in application: Attachment 10, pp. 93A-9
- _ Published literature or other materials (cite below or attach a listing).

D-6c(3): LOADS ON LINER

I. UNIT(S): Landfill Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

Type of liner: HDPE 80 mil thick

X Internal and external pressure gradients

X Stresses caused by settlement, compression, and uplift

\- Stresses caused by freeze-thaw, wet-dry, and exposure to sunlight

X Stresses caused by installation procedures Addressed but not evaluated

X Stresses caused by operational procedures

\- Protection against puncture by plant growth, course particles in bedding layer, and microbial attack

\- Potential for abrasion or wear due to wind or runoff

X Stresses imposed by cover

\- Stresses caused by post-closure land uses

\- _____

\- _____

III. BASIS OF TECHNICAL DECISION

\- Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

o location in application pp. 106.9A - 109A

_____

\- Published literature or other materials (cite below or attach a listing).

Note: 1) Applicant assumes a unit weight of 75 pcf for waste material. This appears to be low.

2) Applicant did not consider climatic stresses, construction loads and external stresses due to hydrostatic forces from the shallow aquifer.

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(2): SUBSURFACE EXPLORATION DATA

I. UNIT(S): Cell II, All Park Clay Mine

II. FACTORS CONSIDERED

Verification by applicant of foundation conditions by:

- _ references to published data
- _ geophysical exploration methods
- _ test pits
- X test borings
- _ in situ testing; type _____

X Test pit and test boring location plan

X Exploration procedures or reference to standard procedures

X Exploration program

- X subsurface soil conditions (including soil type, depths, physical characteristics, and description of how soil was formed)
- X bedrock conditions (including rock descriptions and type, depth, structural features of note, and orientation)
- X hydrogeologic conditions (depth to groundwater and flow direction)
- X geological descriptions (including formation name and age)

X Verification of the analysis of the exploration results

X Appropriateness of number, locations, and depths of borings

X Verification that site materials have been sufficiently characterized

- _ _____
- _ _____

III. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

o location in application p. 104.5A - 104.7A
Attachment 15, Exhibit H

- Published literature or other materials (cite below or attach a listing).

This item is technically adequate.

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(3): LABORATORY TESTING DATA

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

Test results:

- X grain size analysis and index properties
- X moisture content
- X permeability (test results not provided)
- X consolidation
- X strength testing; type unconfined and vane shear
- X moisture-density relationships
- X relative density
- _ ____

- X Sufficient testing performed to classify site material
- X Testing procedures used or referenced standard procedures
- X Verification of the analysis of the test results
- _ ____
- _ ____

III. BASIS OF TECHNICAL DECISION

- X Verification of applicant supplied data.
  - o location in application p. 104.5A - 104.7A
    Attachment 15, Exhibit H
- _ Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(4): ENGINEERING ANALYSES OF LINER FOUNDATION

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

- Published or existing data
- X Subsurface exploration data
- X Soil and/or rock testing data
- X Appropriateness of data used in the analyses
- X Appropriateness of method of analysis
- X Settlement potential (Exhibit D-6d(4)(a))
- X Bearing capacity and stability (Exhibit D-6d(4)(b))
- X Potential for bottom heave or blow-out (Exhibit D-6d(4)(c))
- Construction and operational loading Not provided
- X Seismic conditions (including liquefaction potential)
- X Subsidence potential Not adequately addressed
- X Sinkhole potential Not applicable to this site
- X Appropriateness and sufficiency of subsurface information for input to engineering analyses
- _____
- _____

III. BASIS OF TECHNICAL DECISION

- X Verification of applicant supplied data.
  - o location in application pp. 106.8A - 106.9A
    Attachment 15, Exhibit H
- Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(4)(a): SETTLEMENT POTENTIAL

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Consolidation test results

X Validity of assumed parameters

X Appropriateness of method of analysis

Estimates of:

X total settlement

_ differential settlement

X both primary and secondary consolidation

Stresses imposed by:

X liner

X waste

_ construction and operational equipment

_ vibrations

X cover

_ post-closure land use

_ _____

_ _____

III. BASIS OF TECHNICAL DECISION

_ Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

o location in application pp. 108.3A - 108.7A

_ Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(4)(b): BEARING CAPACITY AND STABILITY

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Strength testing results

- o type Unconfined compression, and vane shear

X Validity of assumed parameters
Strength used is incorrect, should be 600 psf

\- Appropriateness of method of analyses

Bearing capacity analyses:

- X required bearing capacity (based on loadings)
- X allowable bearing capacity (based on subsurface conditions)
- X comparison of two values

X Stability of foundation (including seismic analysis)

X Slope stability of landfill slopes (both seismic and dynamic)

\- Acceptable slope stability safety factors

\- Erosion potential

X Slope Stability Computer Program

X Appropriateness of areas analyzed.

III. BASIS OF TECHNICAL DECISION

\- Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

- o location in application p. 108.9A
  pp. 107.2A - 107.7A

\- Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

Exhibit D-6d(4)(d)

D-6d(4)(d): POTENTIAL FOR BOTTOM HEAVE OR BLOW-OUT

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Unequal hydrostatic pressure

X Bottom heave if below water table

_ Gas pressure

_ ____

_ ____

III. BASIS OF TECHNICAL DECISION

_ Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

- location in application pp. 107.8A - 108.2A

_ Published literature or other materials (cite below or attach a listing).

Analysis provided is technically adequate.

Reviewer: D.A. Balbiani Date: 8/14/85

D-6e(1)(a)
XXXXXX): LINER/WASTE COMPATIBILITY TESTING RESULTS

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

- Published data
- X Appropriateness of test procedures
- X Detailed test results
- X Analysis of test results
  - appropriateness of method of extrapolation of test results
  - comparison to expected service life
  - statistical basis
- Appropriateness of waste/leachate and liner sample tested
- X Method 9090 testing
- _____
- _____

III. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

- location in application Ford Motor Company Report Undated

- Published literature or other materials (cite below or attach a listing).

Note:
1. Test was performed on different liner thickness than that proposed.
2. Brand name and manufacturer unknown.
3. No discussion concerning results, i.e. extrapolation of test results.
4. Test results indicate a significant decrease in tensile strength.

Reviewer: D.A. Balbiani Date: 8/14/85

D-6e(1)(b)
: SYNTHETIC LINER STRENGTH

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Liner compatibility data (Exhibit D-6e(1)(b))

X Liner strength determination (Exhibit D-6c(3))

– Comparison of minimum strength required with liner strength after exposure to waste

– _____

– _____

III. BASIS OF TECHNICAL DECISION

– Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

o location in application Not provided

_____

– Published literature or other materials (cite below or attach a listing).

See Comment D-6e(1)(b)

Reviewer: D.A. Balbiani Date: 8/14/85

D-6f(1)
~~Exhibit D-6f(1)~~: LEACHATE COLLECTION SYSTEM DESIGN AND OPERATION

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Facility layout

X Slopes

X Minimum 2% slope

X Sump design

X Pipe spacing

X Pipe size and capacity

X Permeability of granular drainage material

X Minimum 1-foot depth of granular material

X Flow capacity of synthetic material used to replace granular material not provided

X Maximum depth of leachate is one foot (Exhibit D-6f(4))

X Leachate treated as hazardous waste (No)

_ ____

_ ____

III. BASIS OF TECHNICAL DECISION

X Calculations performed by reviewer (attach all calculations). Based on calculations checked (see Exhibit D-6f(4)) maximum leachate head exceeds one foot.

X Verification of applicant's calculations.

o location in application pp. 121A-136A

____

_ Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

D-6f(4) MAXIMUM LEACHATE HEAD

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Appropriateness of analysis method

X Layout of leachate collection system

X Slope of leachate collection system

X Leachate collection pipe spacing

X Saturated permeability of drainage layer material

X Rainfall (average annual or maximum monthly depending on climate)

_ Porosity of the drainage layer material

_ Maximum leachate head is one foot

X Point at which maximum leachate head is measured:

_ ____

X Operational procedures

X Water Balance Study

_ ____

III. BASIS OF TECHNICAL DECISION

X Calculations performed by reviewer (attach all calculations). Maximum leachate head exceeds one foot.

X Verification of applicant's calculations.

o location in application pp. 122A-123A

X Published literature or other materials (cite below or attach a listing).

US EPA Publication SW-869, April 1983

US EPA Publication SW-870, March 1983

Reviewer: D.A. Balbiani Date: 8/14/85

D-6f(4)

Harding Lawson Associates
Engineers, Geologists
& Geophysicists

SHEET 1 OF 1
JOB NO. 602730920?
DATE 8-12-85
COMPUTED BY DAB
CHECKED BY

PROJECT Allen Park Clay Mine
SUBJECT Calculation of head on primary liner

Check Calculation

1.) Equation used by applicant is significantly different than that presented in April 1983 Revised Edition of SW-869

2.) USE all applicant supplied data to check appropriateness of applicants equation

Per SW-869 p 14

$$h_{max} = \frac{L}{2n}\left[\sqrt{\frac{q}{K_s}} + \tan^2\alpha - \tan\alpha\right]$$

per application $L = 200$ ft

$$q/K_s \doteq q/K_s = 23 \times 10^{-4}$$

$$\tan\alpha = .02$$

Per SW-870 pg 272

n = porosity = .40

$$h_{max} = \frac{200}{(2)(.40)}\left[\sqrt{2.3\times10^{-4} + (.02)^2} - .02\right]$$

$h_{max} = 1.3$ ft. > 1 > .84 (applicants calculation)

* Applicant needs to provide an explanation of the difference between these values.

D-~~6~~f(5)~~(3)~~: SYSTEM CAPABILITY

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

Chemical resistance to waste and leachate of the:

X granular material

X pipes

X filter fabric

X synthetic drainage materials

X pumps and tanks used to transport and store leachate

- _____

- _____

III. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

o location in application p. B2A

_____

- Published literature or other materials (cite below or attach a listing).

Application states that pipe selection is subject to compatibility testing. However, no test results are provided. The pipe materials are similar to those chosen for the liner and if liner test results are acceptable, it is likely that the pipe materials will be.

Reviewer: D.A. Balbiani Date: 8/14/85

Exhibit ~~D-6e(4)~~

D-6f(6)(b)

~~XXXXXXX~~: STRENGTH OF MATERIALS

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Leachate collection pipes; type HDPE 4" diameter

- X static and dynamic loads
- X installation conditions
- X pipe strength (including deflection and crushing resistance as applicable)
- X account for perforations No

X Synthetic drainage material; type non-woven geotextile

- _ static and dynamic loads not provided
- _ crush resistance not provided
- X expected settlement of liner foundation (Exhibit D-6d(4)(a)) 3 feet
- _ allowable elongation of material not provided
- _ ____
- _ ____

III. BASIS OF TECHNICAL DECISION

_ Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

- o location in application pp. 129A - 132A

_____

_ Published literature or other materials (cite below or attach a listing).

See also comment D-6f(6)(a)
Applicant does not address construction loading of pipe and does not account for perforations in pipe.

Reviewer: D.A. Balbiani Date: 8/14/85

Ford Motor Company

3001 Miller Road
Dearborn, Michigan 48121

August 8, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

RCRA Activities
Part B Permit Application
U. S. EPA Region V
P. O. Box 3587
Chicago, Illinois 60690-3587

Attention: 5HS-13

Subject: Ford Allen Park Clay Mine
Exposure Information Requirements
MID 980568711

Enclosed please find four copies of the RCRA Section 3019 Exposure Information Requirements (EIR). The EPA Permit Applicants' Guidance Manual July 3, 1985 was utilized in this submittal. This EIR is to be added to the back of the facility Part B permit application as Section M.

Should you have any questions regarding this submittal, please contact me at (313) 594-2242.

Yours very truly,

David S Miller for
Ben C. Trethewey, Manager
Mining Properties Department

DSM:dp

Attachment

cc: A. Bennett, Allen Park
Dr. Chapman, Dearborn
A. J. Howard, MDNR

228-32

Kearney

MANAGEMENT CONSULTANTS

A. T. KEARNEY, INC.

699 PRINCE STREET/P.O. BOX 1405
ALEXANDRIA, VIRGINIA 22313
703/836-6210
TELEX 248243ATKW UR

Mr. Charles Lewis
Regional Project Officer
Environmental Protection Agency
Region V
230 S. Dearborn Street
Chicago, IL 60604

August 1, 1985

Reference: EPA Contract No. 68-01-7038; Work Assignment R05-02-12, Wayne Disposal Part B Review

Dear Mr. Lewis:

Pursuant to your telephone conversation on July 31, 1985 with John Butler, it is our understanding that all work under the above-mentioned work assignment is to be discontinued until further notice from you. The effective date for stopping work on the project is July 31, 1985. This is due to the fact that, according to Rich Traub (the EPA Technical Monitor), the applicant is submitting additional information to comply with the requirements of the Hazardous and Solid Waste Amendments of 1984.

Upon notice from you, we will revise the project plan in accordance with the new scope and schedule. Please call me if you have any questions.

Sincerely,

Kay H. Breeden

Kay H. Breeden
Technical Director

cc: A. Pearce, EPA Headquarters
*R. Traub, EPA Region V
J. Blasco, HLA
R. Volkmar, MBE
J. Butler
D. Beasley
G. Bennsky
J. Grieve

Kearney

MANAGEMENT CONSULTANTS

A. T. KEARNEY, INC.

699 PRINCE STREET/P.O. BOX 1405
ALEXANDRIA, VIRGINIA 22313
703/836-6210
TELEX 248243ATKW UR

Mr. Charles Lewis
Regional Project Officer
Environmental Protection Agency
Region V
230 S. Dearborn Street
Chicago, IL 60604

August 5, 1985

Reference: EPA Contract No. 68-01-7038; Work Assignment R05-02-11, Ford Allen Park Clay Mine Landfill

Dear Mr. Lewis:

Pursuant to your telephone conversation on July 31, 1985 with John Butler, we are proposing a revised schedule for the above-mentioned work assignment. This revision is needed because of additional information submitted to EPA by the applicant. To accommodate the need to review this information, mailed to us by Region V this week, we propose the following schedule:

Task	Title	Original Milestone	Revised Milestone
01	Project Plan	06/14/85	06/14/85
02	Draft Checklist & Comments Due to QC	08/05/85	08/15/85
98	QC Completed	08/09/85	08/20/85
02	Final Deliverables Due to EPA Region V	08/15/85	08/26/85

Please call me if you have any questions.

Sincerely,

Kay Holub Breeden

Kay Holub Breeden
Technical Director

cc: A. Pearce, EPA Headquarters
R. Traub, EPA Region V
J. Blasco, HLA
R. Volkmar, MBE
J. Butler
D. Beasley
G. Bennsky
J. Grieve

Kearney

MANAGEMENT CONSULTANTS

A. T. KEARNEY, INC.

699 PRINCE STREET/P.O. BOX 1405
ALEXANDRIA, VIRGINIA 22313
703/836-6210
TELEX 248243ATKW UR

Mr. Charles Lewis
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

August 22, 1985

Reference: EPA Contract No. 68-01-7038; Work Assignment R05-02-11; Ford Allen Park Clay Mine Landfill

Dear Mr. Lewis:

Enclosed please find the final deliverables for the above-referenced work assignment, consisting of technical comments, technical review checklist and technical exhibits.

Please call me if you have any questions.

Sincerely,

Kay H. Breeden

Kay H. Breeden
Technical Director

cc: D. Beasley
G. Bennsky
J. Butler
J. Grieve
J. Blasco, HLA
R. Volkmar, MBE

TECHNICAL COMMENTS
FORD (ALLEN PARK CLAY MINE)
MID 980 56 8711

C-1 Chemical and Physical Analyses: 270.14(b)(2), 264.13(a)

The chemical analysis for waste F006 (wastewater treatment sludge from electroplating operations) provides a typical range of hydroxide sludge constituents from a composite of similar generators, but does not indicate if these are analyses of total constituents in the wastes or analyses of the extracts, using the EP toxicity test. Clarify which analyses these results represent. Provide the mean values of the ranges cited.

The application indicates that F006 wastes will be analyzed before acceptance at the site, and that waste analyses will not be available before July 1, 1984 (Section C, page 75). The waste analysis plan for this waste (Attachment 10, page 95A) describes the "fingerprinting" parameters to be used in screening individual waste shipments, but does not provide the test methods to be used in developing the waste analysis. Describe the specific test methods to be used in performing this analysis. If the analysis has been performed, provide the results.

C-1d Landfilled Wastes: 264.314(c)

Provide the results from the Paint Filter Liquids Test (Method 9095 in "Test Methods for Evaluating Solid Wastes, Physical, Chemical Methods", EPA Publication No. SW-846), showing that containerized or bulk wastes do not contain free liquids.

C-2 Waste Analysis Plan: 270.14(b)(3), 264.13(b) and (c)

C-2a Parameters and Rationale: 264.13(b)(1)

Demonstrate that screening procedures will include a determination that containers are at least 90 percent full (264.315(a)).

For waste K061, the proposed analytical parameters for the the EP toxicity test are chromium, cadmium, and lead, which were the constituents upon which the RCRA listing were based. However, based on the waste analysis provided in

Attachment 9, page 81, the waste includes selenium in concentrations indicating EP toxicity for selenium. Therefore, the EP toxicity test should also include selenium, or a demonstration should be provided showing that the EP toxicity test for selenium is not needed.

C-2b Test Methods: 264.13(b)(2)

Provide a description of the quality assurance/quality control program to be used in applying the proposed test methods.

C-2c Sampling Methods: 264.13(b)(3), Part 261, Appendix I

Provide the sampling procedures to be used, and demonstrate that the samples provided by these procedures are representative of the entire waste column.

Provide a description of the quality assurance/quality control program to be used in applying the proposed sampling methods.

Describe chain-of-custody procedures for handling samples, and procedures for preservation of samples.

C-2e Additional Requirements for Wastes Generated Off-Site: 264.13(c)

The waste analysis plan indicates that certain "fingerprinting" parameters will be analyzed for each load, but does not provide a description of the sampling process. Provide the number of drums proposed to be sampled per load and the basis for this sample size.

D-6c Liner System, General Items

D-6c(1) Liner System Description: 270.21(b)(1), 264.301(a) and (c)

The description of the liner system provided does not provide adequate detail. The description must document that any flow through the liners will be prevented. ALso, see Comment D-6d(1), D-6e(1), D-6e(2), and D-6f(1).

D-6c(3) Loads on Liner Systems: 270.21(b)(1), 264.301(a)(1)(i)

In addition to the loads on the liner system discussed in the text, provide the results of calculations that define the following:

- Stresses on the liner system due to climatic conditions (such as freeze-thaw)

- Loads imposed during installation of liner system and operation of landfill (i.e., loads imposed by waste compaction equipment). These loads are especially critical on the side slopes of the landfill excavation, as these areas will not have the leachate collection/detection drainage layers to protect the liner.

The assumed unit weight of the waste materials used to calculate loads (75 pcf) appears to be a low estimate. Provide documentation for the assumed value (e.g., published literature or field measurements) or modify calculations to account for a more conservative value.

D-6c(4) Liner System Coverage: 270.21(b)(1), 264.301(a)(1)(iii)

The "overlap and bonding detail" presented on Sheet 11 indicates that the primary liner will not be physically bonded together with the liner in adjacent cells. Construction of the liner in this manner does not result in a continuous primary liner beneath the site. Modify the design to show that the liners from adjacent cells will be physically seamed, forming a continuous liner.

D-6c(5) Liner System Exposure: 270.21(b)(1), 264.301(a)(1)(i)

Although the HDPE liner will be covered by a geotextile fabric, provide a description of how the liner will be protected from damage due to winds prior to placement of wastes against the upper side slopes.

D-6d Liner System Foundation

D-6d(1) Foundation Description: 270.21(b)(1), 264.301(a)(1)(i)

Provide a more detailed description of the procedures that will be used to dewater the cell bottom and prepare the liner foundation subgrade prior to construction of the secondary liner.

D-6d(3) Laboratory Testing Data: 270.21(b)(1), 264.301(a)(1)(ii)

The applicant must provide a detailed description of the test procedures used to determine the permeability of the site's

soils. The application states on page 17 of Exhibit H that applicable ASTM standards were used; however, the only ASTM procedure for permeability testing is ASTM D2434 which is unsuitable for testing fine grain soils. List all appropriate procedures used.

D-6d(4) Engineering Analysis: 270.21(b)(1), 264.301(a)(1)(ii)

Provide additional information that indicates subsidence due to the presence of the salt mines beneath the site will not be a problem.

D-6d(4)(a) Settlement Potential: 270.21(b)(1), 264.301(a)(1)(ii)

The settlement calculations provided use a total compressible layer thickness of 52 feet including the secondary clay liner. However, the log of Boring TB-1 indicates that this same layer would be up to 67 feet thick. Revise the analyses to account for this difference.

The settlement analysis also assumes a unit weight of 75 pcf for the waste material. This appears to be a low estimate for this type of material. Provide documentation for the assumed value (e.g., published data) or adjust the calculations to account for a more conservative value for the unit weight of the waste.

Based on the varying subsurface conditions and concentrated loads due to berms and sumps, provide estimates of potential differential settlement.

D-6d(4)(b) Bearing Capacity: 270.21(b)(1), 264.301(a)(1)(ii)

The bearing capacity analysis used a shear strength of 900 psf; however, test results presented indicate that the shear strength of these materials is 600 psf. Revise the calculations accordingly.

D-6d(4)(c) Stability of Landfill Slopes: 270.21(b)(1), 264.301(a)(1)(ii)

The stability analyses cannot be technically evaluated until the following information is provided:

- Legible copies of the cross section of the excavation slopes that have been analyzed. The copies included in the application are poorly reproduced and at a scale that

does not permit review of details. For each cross section analyzed, the resulting factor of safety should be clearly labeled.

- Provide a plan view of the landfill indicating the location of all slopes analyzed.

- Provide computer program referenced, including program name, author, and latest revision date.

- Provide a copy of all the computer output that is generated as part of the analyses.

A stability analysis should be performed for the excavation slopes on the eastern side of Cell II. This slope in its upper reaches will be supported by a portion of the completed Cell I landfill. Also, a stability analysis should be performed for the landfill slopes during construction (see Section A-A, Phase II, Sheet 8), as failure of these slopes would significantly impair the integrity of the liner system. Since the landfill wastes will have substantially lower strengths, the stability of these areas is critical. Documentation of the strength parameters of the waste material used in the analysis must be provided.

D-6e Liner Systems, Liners

D-6e(1) Synthetic Liners: 270.21(b)(1), 264.301(a)(1), 264.301(c)

Provide the brand name and manufacturer of the synthetic liner to be used. Detailed synthetic liner specifications must also be provided as per Item D-6g(1)(a).

D-6e(1)(a) Synthetic Liner Compatibility Data: 270.21(b)(1), 264.301(a)(1)(i)

The liner/waste compatibility test data are inadequate. The following information must be provided:

- A detailed description of the testing procedures used or, if appropriate, reference a standard test method.

- A description of how the waste leachate samples were prepared or obtained and a demonstration that they are representative of what the liner will be exposed to in the landfill.

- A description of the synthetic liner tested including thickness, brand name, and manufacturer.

- A discussion and analysis of the test results that demonstrates the liner strength and performance are still adequate after exposure to waste leachates and waste.

D-6e(1)(b) Synthetic Liner Strength: 270.21(b)(1), 264.301(a)(1)(i)

Provide data showing that the synthetic liners have sufficient strength after exposure to the waste and waste leachate to support the loads/stresses as computed in Item D-6c(3). Also demonstrate that the liner seams will have sufficient strength. Demonstrate that the synthetic liner has sufficient strength to handle the expected foundation settlement.

D-6e(1)(c) Synthetic Liner Bedding: 270.21(b)(1), 264.301(a)(1)(ii)

Demonstrate that the geotextile fabric that will be placed over the synthetic liner on the side slopes has sufficient properties to prevent rupture of the synthetic liner during installation and operation. Also, the gradation data for the proposed sand indicates that material up to 1 inch in size may be present. Demonstrate that material of this size will not damage the synthetic liner.

D-6e(2) Soil Liners: 270.21(b)(1), 264.301(a) and (c)

Indicate the borrow source for clay liner material. If the in-place soil will be used, indicate how this material will be selected and stockpiled for later use. Demonstrate the remolded low permeability material that will be used for the soil liner has a permeability of 1×10^{-7} cm/sec or less.

D-6e(2)(a) Material Testing Data: 270.21(b)(1), 264.301(c)

Although the application provides sufficient information concerning the in situ properties of the underlying clay soils, little information is available concerning the remolded clay properties. Therefore, the following must be provided:

- Results of compaction testing indicating maximum dry density and optimum moisture content.

- Results of permeability, strength, and consolidation tests performed on remolded samples. These samples should be compacted to the same percent compaction as is proposed for the liner and must be representative of the material that will be used for the soil liner.

Provide copies of the test procedures or, if appropriate, reference standard test methods, along with complete test results. Discuss the potential for dissolution and piping of the soil due to flow of liquid through the soil liner.

D-6e(2)(b) Soil Liner Compatibility Data: 270.21(b)(1), 264.301(a)(1)(i)

Provide the results of permeability testing of the soil liner material which uses leachate representative of the leachate that the landfill could generate.

The following information must be included:

- A description of the test procedures, or reference to a standard test method

- A description of how the leachate samples were prepared, including a demonstration that the samples are representative of actual landfill conditions

- Complete test results, including a discussion of the effects of the leachate on soil permeability

D-6e(2)(c) Soil Liner Thickness: 270.21(b)(1), 264.301(c)

Until the permeability test results requested in Comment D-6e(2)(a) are provided, this item cannot be deemed adequate.

D-6e(2)(d) Soil Liner Strength: 270.21(b)(1), 264.301(a)(1)(i)

Demonstrate that the soil liner has sufficient strength to support the loads/stresses computed in Item D-6c(3).

D-6f Liner System, Leachate Collection/Detection Systems

D-6f(1) Systems Operation and Design: 270.21(b)(1), 264.301(a)(2)

Provide a detailed description of the drainage fabric that will be used on the upper side slopes of the leachate collection and detection systems. Demonstrate that this material will be capable of transmitting leachate to the collection and detection systems in a timely manner.

The discussion or attached calculations provided in the application do not document the leachate detection system is capable of detecting leachate through the liner in a timely manner. Calculations must document the capacity of the system and the estimated time for leakage to travel to the detection sump. Address this deficiency.

D-6f(2) Equivalent Capacity: 270.21(b)(1), 264.301(a)(2)

Since the leachate collection/detection systems propose to use synthetic drainage material on the upper side slopes to replace the granular drainage material, demonstrate that the proposed system has a drainage capacity, both in speed and volume, that is equal to or better than a 12-inch granular drainage layer with a permeability of 1×10^{-2} cm/sec.

Based on the application, it is unclear if the applicant intends to use filter fabric or drainage net for the leachate collection/detection systems that go up the side walls. Clarify this matter and provide the requested equivalent demonstration for the proposed system.

D-6f(3) Grading and Drainage: 270.21(b)(1), 264.301(a)(2)

Sheet 6 of the design drawings presents the grading plan and pipe layout for the leachate collection/detection systems. However, these sheets also provide numerous other details that inhibit the evaluation of the proposed design. Submit a plan that depicts only the grading plan and pipe layout plan for the leachate collection/detection systems.

The water balance used to determine the leachate impingement rate on the leachate collection system is inadequate. Review of the reference noted for the evaporation rate used does not coincide with the applicant's conclusion. The following issues must be addressed:

- The evaporation rates used must be fully documented. If published data is used, the source of the data must be provided.

- The surface-water runoff coefficient appears to be high for "relatively flat" slopes, as indicated on page 121A. Provide documentation for values used.

- Provide a description of intermediate cover and its slope.

- Snow accumulation must be addressed as part of the water balance.

- Provide the source of rainfall data used in analysis. If the rainfall data is based on the average annual precipitation, discuss what the effects of above-average rainfalls will have on the design.

The calculations provided concerning leachate collection pipe capacity must be revised based on the results of the revised water balance.

The perforated leachate collection pipes are not continuous along the low point of each subcell (Sheet 6). Provide an explanation of how the system will provide adequate collection of all leachate.

Also provide a demonstration that the layout of the leachate monitoring pipes will allow rapid detection of leakage. The pipes, as shown on Sheet 6, are designed in the direction of greatest slope and, as such, will only detect leakage within close proximity to the pipe itself.

Demonstrate that the leachate collection/detection systems will function properly after the anticipated settlements have occurred.

The leachate detection system must be equipped with a system to measure the quantity of leakage collected. Provide a description of the procedures and equipment used to measure leakage into the detection system.

Describe the ultimate fate of the collected leachate after placement into the storage tank. Demonstrate that it will be disposed of properly.

Describe the type of analyses to be performed on the liquids collected in the detection system and the method of disposal of this material.

D-6f(4) Maximum Leachate Head: 270.21(b)(1), 264.301(a)(2)

The equation used by the applicant to determine the maximum head over the synthetic liner does not agree with the guidance provided in the EPA publication SW-869 (April 1983). A check calculation using the referenced guidance, the applicant's data, and an assumed value of 0.4 for the porosity of the drainage layer results in a maximum leachate head of 1.3 feet (see Exhibit D-6f(4). Provide an explanation for the difference in results. Note that the equation used by the applicant was presented in the earlier edition of SW-869; however, it was removed when the publication was revised in 1983.

Also, as mentioned in Comment D-6f(3), the water balance used to determine the impingement rates is inadequate. Revise the analysis of the maximum leachate head to include the new value for the impingement rate.

D-6f(5) Systems Compatibility: 270.21(b)(1), 264.301(a)(2)(i)(A)

On page 132A of the application, it states that the pipe selection was subject to compatibility testing, but no test results are presented. Demonstrate that all components of the leachate collection/detection systems are chemically resistent to the waste managed in the landfill and the leachate expected to be generated.

D-6f(6) Systems Strength

D-6f(6)(a) Stability of Drainage Layers: 270.21(b)(1), 264.301(a)(2)(i)(B)

Demonstrate that the drainage layers of the leachate collection/detection systems have sufficient strength and thickness to support the loads computed in Item D-6c(3). Demonstrate that the drainage layers placed on side slopes of the landfill or foundation will be stable during construction.

D-6f(6)(b) Strength of Piping: 270.21(b)(1), 264.301(a)(2)(i)(B)

The pipe deflection analysis does not consider the effects of the pipe perforations on the pipes ability to withstand the stated loads. The analysis must be redone using the method described in EPA publication SW-870.

Also, the analysis does not address the expected loading due to construction equipment during installation. During placement of the leachate collection/detection drainage layer, the piping will have the least amount of cover (less than 1 foot of sand) and be subject to damage. Provide documentation that the pipes can withstand anticipated construction loads.

D-6f(7) Prevention of Clogging: 270.21(b)(1), 264.301(a)(2)(ii)

The application does not address chemical clogging of the leachate collection/detection systems. Provide a description of how clogging would be detected and what cleanout procedures would be used to restore capacity of the systems.

D-6g Liner System, Construction, and Maintenance

D-6g(1) Material Specifications

D-6g(1)(a) Synthetic Liners: 270.21(b)(1), 264.301(a)(1)

Provide detailed material specifications for the specific synthetic liner to be used.

D-6g(1)(b) Soil Liner: 270.21(b)(1), 264.301(a)(1)

The soil liner specifications must be revised to include the following:

- Maximum particle size
- Procedures for obtaining undisturbed samples of the in-place clay liner
- Provide procedures for in-place permeability tests of the clay liner.
- Criteria that will be used to approve completed portions of the clay liner prior to placement of additional components of the liner system.

The specifications allow the moisture content of the liner material to vary from 2 percent dry to 5 percent wet of the optimum moisture content. Based on the two compaction curves presented in Exhibit H of Attachment 15, it is not possible to obtain the required compacted moisture contents at 5 percent wet of optimum. Revise the specifications accordingly.

D-6g(1)(c) Leachate Collection/Detection Systems: 270.21(b)(1), 264.301(a) and (c)

The specifications provided for geotextile drainage fabric and filters do not provide sufficient detail. Provide detailed specifications for these materials and any other materials to be used in the collection/detection systems indicating minimum strength requirements, thickness, material type, etc. Provide specific manufacturer and brand name, if available. Provide specifications for the pre-cast concrete sumps.

D-6g(2) Construction Specifications

D-6g(2)(a) Liner System Foundation: 270.21(b)(1), 264.301(a)(1), 264.303(a)

Provide construction specifications for preparation of the liner system foundation.

D-6g(2)(b) Soil Liner: 270.21(b)(1), 264.301(a)(1), 264.303(a)(2)

The construction specifications for the soil liner do not provide sufficient detail. Modify the specifications to include a detailed description of:

- Moisture conditioning methods
- Provisions for scarifying between lifts
- Provisions for preparing the liner surface prior to installation of the leachate detection system. Also, provide a detailed description of the construction techniques that will be used to build the clay liner against the excavation side walls. Include procedures for preparing the side wall foundation materials.

D-6g(2)(c) Synthetic Liners: 270.21(b)(1), 264.301(a)(1), 264.303(a)(1)

Provide construction specifications for placement of the synthetic liners which include:

- inspection of the synthetic liner bed for material which could puncture the liner (and removeal of that material);
- placement procedures;
- techniques to be utilized to bond the liner seams; and
- procedures for protection of the liner before and during placement of material on top of the liner.

D-6g(2)(d) Leachate Collection/Detection Systems: 270.21(b)(1), 264.301(a) and (c)

Provide construction specifications for placement of all components of the leachate collection/detection systems, including:

- drainage layers;
- piping;
- sumps, pumps, etc.;
- filter layers; and
- any protective layer placed to protect the system during construction or operations.

D-6g(3) Construction Quality Control Program: 270.21(b)(1), 270.30(k)(2), 264.303(a)

The construction quality control program has the following deficiencies:

- Frequency of testing of the soil liner is not adequate. The proposed frequency is equivalent to one test per 27,000 square feet of clay liner installed (1 foot thick). The same comment applies to the frequency of moisture content testing.

- Frequency of in situ permeability testing is inadequate and does not include in-place permeability testing. The proposed frequency would result in one test for every 135,000 square feet of completed liner (5 feet thick).

Address these deficiencies.

The program presented in the application generally does not provide the appropriate level of detail. For guidance on this matter, the applicant is referred to the "Draft Guidance on Implementation of the Minimum Technological Requirements of the Hazardous and Solid Waste Commandments of 1984," May 24, 1985, EPA/530-SW-85-014.

D-6g(4) Maintenance Procedures for Leachate Collection/Detection Systems: 270.21(b)(1), 264.301(a) and (c)

Describe the anticipated maintenance activities that will be used to assure proper operation of the leachate collection/detection systems throughout the landfill's expected life.

D-6g(5) Liner Repairs During Operations: 270.21(b)(1), 264.301(a)

Describe the methods that will be used to repair any damage to the liner which occurs while the landfill is in operation during placement of the waste (such as a dozer ripping the liner).

		Technically Adequate (Y/N)	See Attached Comment	See Attached Exhibit	Location of Information
C. WASTE CHARACTERISTICS					
C-1	Chemical and physical analyses, including sampling/analysis methods	N	X	X	Sec. B, pp. 32-60; Sec. C, pp. 73-90
C-1a	Containerized wastes	N/A			
C-1b	Waste in tanks	N/A			
C-1c	Waste in piles	N/A			
C-1d	Landfilled wastes	N	X		Not provided in application
C-1e	Wastes incinerated and wastes used in performance tests	N/A			
C-1f	Wastes to be land treated	N/A			
C-2	Waste analysis plan				
C-2a	Parameters and rationale	N	X	X	Attachment 10, pp. 93A-98A
C-2b	Test methods	N	X	X	Attachment 10, pp. 93A-98A
C-2c	Sampling methods	N	X	X	Attachment 10, pp. 93A-98A
C-2d	Frequency of analyses	Y			Attachment 10, pp. 93A-98A
C-2e	Additional requirements for wastes generated off-site	N	X	X	Attachment 10, pp. 93A-98A
C-2f	Additional requirements for ignitable, reactive or incompatible wastes	N/A			

		Technically Adequate (Y/N)	See Attached Comment	See Attached Exhibit	Location of Information
D-6	Landfills				
D-6a	List of wastes				
D-6b	Liner system exemption requests				
D-6b(1)	Exemption based on existing portion				
D-6b(2)	Exemption based on alternative design and location				
D-6b(3)	Exemption for monofills				
D-6b(4)	Groundwater monitoring exemption				
D-6b(4)(a)	Engineered structure				
D-6b(4)(b)	No liquid waste				
D-6b(4)(c)	Exclusion of liquids				
D-6b(4)(d)	Containment system				
D-6b(4)(e)	Leak detection system				
D-6b(4)(f)	Operation of leak detection system				
D-6b(4)(g)	No migration				
D-6c	Liner system, general items				pp. 104A - 109A
D-6c(1)	Liner system description	N	X		p. 104A
D-6c(2)	Liner system location relative to high water table	Y			Attachment 15, Exhibit H, p. 31
D-6c(3)	Loads on liner system	N	X	X	pp. 104.1A - 104.4A, 106.9A - 109A
D-6c(4)	Liner system coverage	N	X		Attachment 14, Sheets 6, 7 and 11
D-6c(5)	Liner system exposure prevention	N	X		p. 104.4A

		Technically Adequate (Y/N)	See Attached Comment	See Attached Exhibit	Location of Information
D-6d	Liner system, foundation				
D-6d(1)	Foundation description	N	X		pp. 104.5A-104.7A, Attachment 15, Exhibit H
D-6d(2)	Subsurface exploration data	Y		X	pp. 104.5A-104.7A, Attachment 15, Exhibit H
D-6d(3)	Laboratory testing data	N	X	X	pp. 104.5A-104.7A, Attachment 15, Exhibit H
D-6d(4)	Engineering analysis				
D-6d(4)(a)	Settlement potential	N	X	X	pp. 108.3A-108.7A
D-6d(4)(b)	Bearing capacity	N	X	X	p. 108.9A
D-6d(4)(c)	Stability of landfill slopes	N	X	D-6d(4)(b)	pp. 107.2A-107.7A
D-6d(4)(d)	Potential for excess hydrostatic or gas pressure	Y		X	pp. 107.8A-108.2A
D-6e	Liner system, liners				
D-6e(1)	Synthetic liners	N	X		p. 104.1A
D-6e(1)(a)	Synthetic liner compatibility data	N	X	X	Ford Motor Company Report
D-6e(1)(b)	Synthetic liner strength	N	X	X	Not provided
D-6e(1)(c)	Synthetic liner bedding	N	X		p. 104.3A
D-6e(2)	Soil liners	N	X		p. 104.4A-104.5A
D-6e(2)(a)	Material testing data	N	X		p. 104.4A-104.7A
D-6e(2)(b)	Soil liner compatibility data	N	X		Not provided
D-6e(2)(c)	Soil liner thickness	N	X		pp. 104.4A, p. 169
D-6e(2)(d)	Soil liner strength	N	X		
D-6f	Liner system, leachate collection/detection systems				pp. 104.1A-104.4A, 110-113, 118A-125A
D-6f(1)	System operation and design	N	X	X	pp. 104.1A-104.4A, 110-113, 118A-125A
D-6f(2)	Equivalent capacity	N	X		Not provided

		Technically Adequate (Y/N)	See Attached Comment	See Attached Exhibit	Location of Information
D-6f(3)	Grading and drainage	N	X		pp. 104.1A-104.4A, 110-113, 118A-125A
D-6f(4)	Maximum leachate head	N	X	X	pp. 122A-123A
D-6f(5)	System compatibility	N	X	X	p. 132A
D-6f(6)	System strength				
D-6f(6)(a)	Stability of drainage layers	N	X		Not provided
D-6f(6)(b)	Strength of piping	N	X	X	pp. 130A-133A
D-6f(7)	Prevention of clogging	N	X	X	pp. 124A-128A
D-6g	Liner system, construction and maintenance				
D-6g(1)	Material specifications				
D-6g(1)(a)	Synthetic liners	N	X		p. 104.1A
D-6g(1)(b)	Soil liners	N	X		pp. 111A-112A
D-6g(1)(c)	Leachate collection/detection systems	N	X		p. 120A
D-6g(2)	Construction specifications				
D-6g(2)(a)	Liner system foundation	N	X		pp. 111A-112A
D-6g(2)(b)	Soil liner	N	X		pp. 111A-112A
D-6g(2)(c)	Synthetic liners	N	X		pp. 112A-118A
D-6g(2)(d)	Leachate collection/detection systems	N	X		pp. 118A-120A
D-6g(3)	Construction quality control program	N	X		pp. 110A-120A
D-6g(4)	Maintenance procedures for leachate collection/detection system	N	X		Not provided
D-6g(5)	Liner repairs during operations	N	X		Not provided

Exhibit C-1

C-1: PHYSICAL AND CHEMICAL DESCRIPTION OF WASTES

I. FACTORS CONSIDERED

- X Wastes to be handled, RCRA number and basis for hazard designation
- _ Hazardous constituents listed in Appendix VII to 40 CFR Part 261
- _ Treatment, storage and disposal units (or processes) to be permitted, as well as specific process requirements and tolerance limits
- X Physical descriptions of wastes
- X Chemical descriptions of wastes
- X Sources of wastes (i.e., how generated)
- X Physical state of wastes
- X Ignitability, reactivity and/or incompatibility
- X Source of data (e.g., lab reports, documented data from a similar process) (lab reports and documented data from similar processes)
- _ Appendix VIII constituents, where applicable
- _ _____
- _ _____

II. BASIS OF TECHNICAL DECISION

- X Data provided by applicant (e.g., laboratory analytical results, material safety data sheets).
- _ Published literature or other materials (cite below or attach a listing).

Exhibit C-2a

C-2a: WASTE ANALYSIS PLAN - PARAMETERS AND RATIONALE

I. FACTORS CONSIDERED

- X Parameters to be analyzed for
- X Wastes to be managed and their hazard characteristics
- X Hazardous waste TSD processes and appropriateness of parameters to be analyzed for to those processes
- X Process tolerance limits (Note: No corrosive, ignitable, or reactive wastes)
- X Waste characterization data provided in Part B application
- X Reactive or ignitable wastes
- X Potential waste incompatibilities
- X Physical states of wastes
- X Rationale for parameters selected
- X Sources of wastes and variability of waste composition
- _____
- _____

II. BASIS OF TECHNICAL DECISION

- X Verification of applicant supplied data.
  - o location in application: Attachment 10, pp. 93A-98
- _ Published literature or other materials (cite below or attach a listing).

C-2b: WASTE ANALYSIS PLAN - TEST METHODS

I. FACTORS CONSIDERED

X Test parameters

X Physical state of samples

X Wastes and their constituents

_ Possible interferences

X Acceptability of test methods

_ Accuracy and limits of detection

X QA/QC program (not provided)

_ _____

_ _____

II. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

o location in application Attachment 10, pp. 93A-98A

_____

_ Published literature or other materials (cite below or attach a listing).

Exhibit C-1c

C-2c: WASTE ANALYSIS PLAN - SAMPLING METHODS

I. FACTORS CONSIDERED

X Physical state (i.e., solid, liquid, gas) of wastes

X Potential for layered wastes

X Sampling devices and procedures

_ Locations of sampling

X Randomness or representativeness of samples (not provided)

X Composite vs. grab samples

_ Sample containers

_ Method of identifying samples

X Chain of custody procedures (not provided)

X Preservation of samples (not provided)

X QA/QC program (not provided)

_ _____

_ _____

II. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

o location in application: Attachment 10, pp. 93A-98A

_____

_ Published literature or other materials (cite below or attach a listing).

Exhibit C-2e

C-2e: WASTE ANALYSIS PLAN - ADDITIONAL REQUIREMENTS FOR WASTES GENERATED OFF-SITE

I. FACTORS CONSIDERED

- X Nature of the wastes to be received from off-site
- X Volume of shipments and variability of waste composition
- _ Pre-acceptance testing
- X Physical state of wastes
- X Potential for layering of waste
- X Physical inspection and fingerprint analysis of incoming waste loads
- X Sampling devices and procedures for fingerprinting of incoming waste loads
- X Fingerprint analysis methods
- _ Reanalysis procedures when test results are inconsistent with previous data
- X Criteria for waste acceptance/rejection
- X Procedure for returning or rerouting rejected waste loads
- X Statistical basis for number of samples (not provided)
- _ QA/QC program
- _ _____
- _ _____

II. BASIS OF TECHNICAL DECISION

- X Verification of applicant supplied data
  - o location in application: Attachment 10, pp. 93A-9
- _ Published literature or other materials (cite below or attach a listing).

D-6c(3): LOADS ON LINER

I. UNIT(S): Landfill Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

Type of liner HDPE 80 mil thick

X Internal and external pressure gradients

X Stresses caused by settlement, compression, and uplift

\- Stresses caused by freeze-thaw, wet-dry, and exposure to sunlight

X Stresses caused by installation procedures Addressed but not evaluated

X Stresses caused by operational procedures

\- Protection against puncture by plant growth, course particles in bedding layer, and microbial attack

\- Potential for abrasion or wear due to wind or runoff

X Stresses imposed by cover

\- Stresses caused by post-closure land uses

\- _____

\- _____

III. BASIS OF TECHNICAL DECISION

\- Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

- location in application pp. 106.9A - 109A

_____

\- Published literature or other materials (cite below or attach a listing).

Note: 1) Applicant assumes a unit weight of 75 pcf for waste material. This appears to be low.

2) Applicant did not consider climatic stresses, construction loads and external stresses due to hydrostatic forces from the shallow aquifer.

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(2): SUBSURFACE EXPLORATION DATA

I. UNIT(S): Cell II, All Park Clay Mine

II. FACTORS CONSIDERED

Verification by applicant of foundation conditions by:

- _ references to published data
- _ geophysical exploration methods
- _ test pits
- X test borings
- _ in situ testing; type _____

X Test pit and test boring location plan

X Exploration procedures or reference to standard procedures

X Exploration program

- X subsurface soil conditions (including soil type, depths, physical characteristics, and description of how soil was formed)
- X bedrock conditions (including rock descriptions and type, depth, structural features of note, and orientation)
- X hydrogeologic conditions (depth to groundwater and flow direction)
- X geological descriptions (including formation name and age)

X Verification of the analysis of the exploration results

X Appropriateness of number, locations, and depths of borings

X Verification that site materials have been sufficiently characterized

- _ _____
- _ _____

III. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

o location in application p. 104.5A - 104.7A
Attachment 15, Exhibit H

_ Published literature or other materials (cite below or attach a listing).

This item is technically adequate.

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(3): LABORATORY TESTING DATA

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

Test results:

- X grain size analysis and index properties
- X moisture content
- X permeability (test results not provided)
- X consolidation
- X strength testing; type unconfined and vane shear
- X moisture-density relationships
- X relative density
- _____

X Sufficient testing performed to classify site material

X Testing procedures used or referenced standard procedures

X Verification of the analysis of the test results

_____

_____

III. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

- o location in application p. 104.5A - 104.7A
  Attachment 15, Exhibit H

_ Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(4): ENGINEERING ANALYSES OF LINER FOUNDATION

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

- _ Published or existing data
- X Subsurface exploration data
- X Soil and/or rock testing data
- X Appropriateness of data used in the analyses
- X Appropriateness of method of analysis
- X Settlement potential (Exhibit D-6d(4)(a))
- X Bearing capacity and stability (Exhibit D-6d(4)(b))
- X Potential for bottom heave or blow-out (Exhibit D-6d(4)(c))
- _ Construction and operational loading Not provided
- X Seismic conditions (including liquefaction potential)
- X Subsidence potential Not adequately addressed
- X Sinkhole potential Not applicable to this site
- X Appropriateness and sufficiency of subsurface information for input to engineering analyses
- _ _____
- _ _____

III. BASIS OF TECHNICAL DECISION

- X Verification of applicant supplied data.
  - o location in application pp. 106.8A - 106.9A
    Attachment 15, Exhibit H
- _ Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(4)(a): SETTLEMENT POTENTIAL

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Consolidation test results

X Validity of assumed parameters

X Appropriateness of method of analysis

Estimates of:

X total settlement

_ differential settlement

X both primary and secondary consolidation

Stresses imposed by:

X liner

X waste

_ construction and operational equipment

_ vibrations

X cover

_ post-closure land use

_ _____

_ _____

III. BASIS OF TECHNICAL DECISION

_ Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

o location in application pp. 108.3A - 108.7A

_____

_ Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

D-6d(4)(b): BEARING CAPACITY AND STABILITY

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Strength testing results

- o type Unconfined compression, and vane shear

X Validity of assumed parameters
Strength used is incorrect, should be 600 psf

\- Appropriateness of method of analyses

Bearing capacity analyses:

X required bearing capacity (based on loadings)

X allowable bearing capacity (based on subsurface conditions)

X comparison of two values

X Stability of foundation (including seismic analysis)

X Slope stability of landfill slopes (both seismic and dynamic)

\- Acceptable slope stability safety factors

\- Erosion potential

X Slope Stability Computer Program

X Appropriateness of areas analyzed.

III. BASIS OF TECHNICAL DECISION

\- Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

- o location in application p. 108.9A
  pp. 107.2A - 107.7A

\- Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

Exhibit D-6d(4)(d)

D-6d(4)(d): POTENTIAL FOR BOTTOM HEAVE OR BLOW-OUT

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Unequal hydrostatic pressure

X Bottom heave if below water table

_ Gas pressure

_ ____

_ ____

III. BASIS OF TECHNICAL DECISION

_ Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

o location in application pp. 107.8A - 108.2A

_____

_ Published literature or other materials (cite below or attach a listing).

Analysis provided is technically adequate.

Reviewer: D.A. Balbiani Date: 8/14/85

D-6e (1) (a)
XXXXXX: LINER/WASTE COMPATIBILITY TESTING RESULTS

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

- _ Published data
- X Appropriateness of test procedures
- X Detailed test results
- X Analysis of test results
  - _ appropriateness of method of extrapolation of test results
  - _ comparison to expected service life
  - _ statistical basis
- _ Appropriateness of waste/leachate and liner sample tested
- X Method 9090 testing
- _ _____
- _ _____

III. BASIS OF TECHNICAL DECISION

- X Verification of applicant supplied data.
  - o location in application Ford Motor Company Report Undated
- _ Published literature or other materials (cite below or attach a listing).

Note:
1. Test was performed on different liner thickness than that proposed.
2. Brand name and manufacturer unknown.
3. No discussion concerning results, i.e. extrapolation of test results.
4. Test results indicate a significant decrease in tensile strength.

Reviewer: D.A. Balbiani Date: 8/14/85

D-6e(1)(b)
EXHIBIT: SYNTHETIC LINER STRENGTH

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Liner compatibility data (Exhibit D-6e(1)(b))

X Liner strength determination (Exhibit D-6c(3))

– Comparison of minimum strength required with liner strength after exposure to waste

– _____

– _____

III. BASIS OF TECHNICAL DECISION

– Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

o location in application Not provided

_____

– Published literature or other materials (cite below or attach a listing).

See Comment D-6e(1)(b)

Reviewer: D.A. Balbiani Date: 8/14/85

D-6f(1)
~~Exhibit~~: LEACHATE COLLECTION SYSTEM DESIGN AND OPERATION

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Facility layout

X Slopes

X Minimum 2% slope

X Sump design

X Pipe spacing

X Pipe size and capacity

X Permeability of granular drainage material

X Minimum 1-foot depth of granular material

X Flow capacity of synthetic material used to replace granular material not provided

X Maximum depth of leachate is one foot (Exhibit D-6f(4))

X Leachate treated as hazardous waste (No)

_ ____

_ ____

III. BASIS OF TECHNICAL DECISION

X Calculations performed by reviewer (attach all calculations). Based on calculations checked (see Exhibit D-6f(4)) maximum leachate head exceeds one foot.

X Verification of applicant's calculations.

o location in application pp. 121A-136A

_ Published literature or other materials (cite below or attach a listing).

Reviewer: D.A. Balbiani Date: 8/14/85

D-6f(4) MAXIMUM LEACHATE HEAD

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Appropriateness of analysis method

X Layout of leachate collection system

X Slope of leachate collection system

X Leachate collection pipe spacing

X Saturated permeability of drainage layer material

X Rainfall (average annual or maximum monthly depending on climate)

_ Porosity of the drainage layer material

_ Maximum leachate head is one foot

X Point at which maximum leachate head is measured:

_ ____

X Operational procedures

X Water Balance Study

_ ____

III. BASIS OF TECHNICAL DECISION

X Calculations performed by reviewer (attach all calculations). Maximum leachate head exceeds one foot.

X Verification of applicant's calculations.

- location in application pp. 122A-123A

X Published literature or other materials (cite below or attach a listing).

US EPA Publication SW-869, April 1983

US EPA Publication SW-870, March 1983

Reviewer: D.A. Balbiani Date: 8/14/85

D-6f(4)

Harding Lawson Associates
Engineers, Geologists
& Geophysicists

SHEET 1 OF 1
JOB NO. 60273092.07
DATE 8-12-85
COMPUTED BY DAB
CHECKED BY

PROJECT Allen Park Clay Mine
SUBJECT Calculation of head on primary liner

Check Calculation

1) Equation used by applicant is significantly different than that presented in April 1983 Revised Edition of SW-869

2.) USE all applicant supplied data to check appropriateness of applicants equation

Per SW-869 p 14

$$h_{max} = \frac{L}{2n}\left[\sqrt{\frac{e}{k_{s1}} + \tan^2\alpha} - \tan\alpha\right]$$

per application $L = 200$ ft

$$e/k_{s1} \doteq q/k_{s1} = 23\times10^{-4}$$

$$\tan\alpha = .02$$

Per SW-870 pg 272

n = porosity = .40

$$h_{max} = \frac{200}{(2)(.40)}\left[\sqrt{2.3\times10^{-4} + (.02)^2} - .02\right]$$

$h_{max} = 1.3$ ft. > 1 > .84 (applicants calculation)

* Applicant needs to provide an explanation of the difference between these values.

D-6~~(3)~~ f(5): SYSTEM CAPABILITY

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

Chemical resistance to waste and leachate of the:

X granular material

X pipes

X filter fabric

X synthetic drainage materials

X pumps and tanks used to transport and store leachate

_ ____

_ ____

III. BASIS OF TECHNICAL DECISION

X Verification of applicant supplied data.

o location in application p. B2A

_____

_ Published literature or other materials (cite below or attach a listing).

Application states that pipe selection is subject to compatibility testing. However, no test results are provided. The pipe materials are similar to those chosen for the liner and if liner test results are acceptable, it is likely that the pipe materials will be.

Reviewer: D.A. Balbiani Date: 8/14/85

Exhibit ~~D-6e(4)~~

D-6f(6)(b)

~~XXXXXXX~~: STRENGTH OF MATERIALS

I. UNIT(S): Cell II, Allen Park Clay Mine

II. FACTORS CONSIDERED

X Leachate collection pipes; type HDPE 4" diameter

- X static and dynamic loads
- X installation conditions
- X pipe strength (including deflection and crushing resistance as applicable)
- X account for perforations No

X Synthetic drainage material; type non-woven geotextile

- _ static and dynamic loads not provided
- _ crush resistance not provided
- X expected settlement of liner foundation (Exhibit D-6d(4)(a)) 3 feet
- _ allowable elongation of material not provided
- _ ____
- _ ____

III. BASIS OF TECHNICAL DECISION

_ Calculations performed by reviewer (attach all calculations).

X Verification of applicant's calculations.

- o location in application pp. 129A - 132A

_ Published literature or other materials (cite below or attach a listing).

See also comment D-6f(6)(a)
Applicant does not address construction loading of pipe and does not account for perforations in pipe.

Reviewer: D.A. Balbiani Date: 8/14/85

Ford Motor Company

3001 Miller Road
Dearborn, Michigan 48121

May 30, 1985

CERTIFIED MAIL

RCRA Activities
Part B Permit Application
U.S. EPA Region V
P. O. Box 3587
Chicago, IL 60690-3587

Attention: 5HS-13

Subject: Ford Allen Park Clay Mine
Part B Permit Application
MID 980568711

Enclosed please find four copies of the Corrective Action Requirements (Section L) of the facility Part B permit application.

Replace page i of the application with page ia.

Add Section L to the back of the permit application.

Should you have any questions regarding this submittal, please contact me at (313) 594-2242.

Yours very truly,

Ben C. Trethewey, Manager
Mining Properties Department

BCT:dp

Attachments

cc: Mr. A. Bennett, A.P.
Mr. Alan J. Howard, MDNR

COPY 2